

relieved in some places by extensive open plains covered with tall grasses, and the forest vegetation is rapidly disappearing, owing largely to the wasteful habits of the natives. The accompanying seismic tables contain records of the earthquakes that occurred between the years 1843-86, some of which were very violent and attended by marine disturbances destructive to shipping, and driving boats and barges hundreds of yards inland. But there are no active volcanoes, and the prevailing formation appears to be a much-weathered compact limestone resting on gray or bluish Miocene marls and other argillaceous clays. The geological as well as the zoological conditions show that Nias, like the other islands running parallel to the west coast of Sumatra, must have formerly been connected with the mainland; and as Sumatra itself at one time certainly formed part of the Malay Peninsula, this chain of insular groups would appear to mark the original line of the Asiatic seaboard in this direction. Signor Modigliani's collections include 178 birds, representing 62 species, of which 8 are described as new, but allied to corresponding species in Sumatra; consequently the separation must have taken place at a very remote period—a conclusion also confirmed by other considerations. His rich zoological collection, comprising over 7000 specimens, has been presented to the Museum of Genoa.

METEOROLOGICAL NOTES.

THE Report on the Meteorology of India in 1885, being the eleventh year of the series, has just been published, and contains an immense mass of valuable information. The accumulation of Indian statistics during the last ten years may be best shown by a comparison of the following figures:—The number of stations at which the mean temperature is recorded has increased from 51 to 127, and the rainfall stations from 134 to 471. From this huge volume of 516 large quarto pages we can only note here a very few general remarks. Considerable attention is paid to solar radiation, the chief feature of which is found to be that the maximum intensity generally occurs during the winter half of the year (October to March), when the sun is in southern declination, and the thickness of the absorbing atmosphere traversed by the sun's rays is at a maximum. This is said to be apparently due to the fact that over a large part of India the atmosphere is most cloudy in the summer and autumn months. It would appear from the mean result of the sun-thermometer readings in all parts of India that the average intensity of solar heat had reached a minimum in 1884, and in 1885 underwent an appreciable increase. The duration of bright sunshine is now regularly recorded at four stations, and Mr. Blanford considers that the sunshine-recorder promises to be even more important than the sun-thermometer, since the duration of sunshine is a more direct measure of the amount of solar heat reaching the earth's surface than the registry of its mean maximum intensity. Anemometers are in use at nearly all the stations, and fourteen of them are large anemographs of the Kew pattern. The resultant direction of the winds is, however, computed by Lambert's old formula, which is based on the assumption that the force of all winds is equal, an assumption which is obviously often very misleading. The work is accompanied by maps showing the positions of the meteorological observatories and the mean distribution of temperature, pressure, and wind.

M. GARRIGOU-LAGRANGE describes, in the *Annuaire de la Société Météorologique de France*, his apparatus for registering the ascending and descending air-currents. The experimental anemometer is fixed on a mast at Limoges, and consists of four small fans moving round a vertical axis, and recording, by electrical arrangements, on a drum covered with ruled forms. The curves obtained by this method show plainly the upward or downward movement of the air, and the velocity is easily read off. The experiments show that ascending winds are generally stronger and more frequent than the descending, owing no doubt to the eddies caused by obstacles met with by the currents.

IN *Das Wetter* M. Seemann discusses the results of the storm-warnings issued by the *New York Herald* between September 1886 and January 1887, and finds that out of twelve warnings only three were quite successful, and three partially so. The wording of the telegrams is not so absolute as formerly; many of the depressions pass to the northward of our islands, and our weather is *disturbed*, although the gales do not always strike our coasts; judged in this light, the warnings may be more successful than when actual storms are predicted. On pp. 83-87 of

the same journal Dr. C. Lang describes his method of predicting night-frost, from the position of the dew-point. From the Munich observations for 1879-86 he finds that 441 predictions of night-frost could be given, of which 89 per cent. were successful. In 8 per cent. of the cases, night-frost did not follow, and in 3 per cent. frost occurred unexpectedly. This method may be of considerable benefit to agriculturists; reference to this subject has been made by Mohn, Buchan, and others.

DR. GROSSMANN has published "*Meteorologische Divisions-tafeln*" (Hammerich and Lesser, Altona), which will be very useful to meteorological observers in the calculation of monthly means, and daily means from hourly observations. For a dividend of four figures the quotient is given by simple inspections, and for more figures by interpolation by means of a table of proportional parts. The principle of construction is due to Dr. Köppen, and some of the tables were printed in *Aus dem Archiv der Deutschen Seewarte*, vol. i. 1878. Dr. Crelle's well known "*Tables de Calcul*" (Reimer, Berlin, 1869) are equally useful, but being in a large volume are not easily accessible to observers generally. The chief merit of Dr. Grossmann's tables lies in their publication in a form specially suitable to the wants of meteorological observers, and at the low price of about sixpence for single copies. They extend to four pages only, and are intended to be pasted on cardboard.

THE Italian Central Meteorological Office has published its *Annali* for the year 1884, in three thick folio volumes, containing a mass of meteorological, magnetical, and astronomical data. The meteorological services of Italy are very complicated, as in addition to the Central Office there are many large and independent establishments from which we possess long series of observations, some of them dating from the middle of last century. The Government established a Committee for Weather Telegraphy in 1863, under M. Matteucci, and in 1865 the Meteorological Section of the Ministry of Agriculture commenced the issue of the *Meteorologia Italiana*; from this originated the present office in 1877, located at the Collegio Romano. The service is now under the able superintendence of M. Tacchini, and includes 135 stations of the second order, some of which, e.g. those of Stelvio, Valdobbia, Cimone, and Etna are important mountain observatories; in addition to which there are 515 rainfall stations, and stations at the military settlements of Assab and Massowah. The work contains valuable discussions on thunderstorms, evaporation, and on the microscopical examination of atmospheric dust.

A SPECIAL meeting of the Meteorological Society of Mauritius, in honour of the Queen's Jubilee, was held on August 6, on which occasion Dr. Meldrum gave an interesting sketch of the origin and labours of the Society, and of the Royal Alfred Observatory. Charts were exhibited showing the tracks of the cyclones in the Southern Indian Ocean in each year from 1856 to 1886, also magnetograms showing simultaneous disturbances at Zi-ka-wei and Mauritius on January 9, 1886; and curves showing the apparent connection between solar, magnetical, and auroral phenomena, and also between solar phenomena and the frequency of cyclones, rainfall, and the depth of water in rivers, together with other articles of interest. Dr. Meldrum stated, with reference to the history of meteorology in the island, that a memorial was presented to the Governor in April 1851, suggesting the desirability of systematic observations, and the Meteorological Society was consequently founded on August 1 of that year. Shortly afterwards the office of Government Meteorological Observer was created, to which office Mr. Meldrum succeeded in 1862, and the two institutions, although distinct, have co-operated with each other. Regular observations were commenced at the new Observatory (*see NATURE*, vol. xxvi. p. 546) in November 1874. We cannot enumerate here the many useful works which have been carried on, but the Hydrographer to the Admiralty has expressed the wish that the track charts should be published, and Mr. Meldrum has been informed that the Meteorological Council would probably publish them. He also states that tide-gauges will soon be erected at two points on the coast, and expresses a desire for the establishment of a high mountain station.

IN the *American Meteorological Journal* for September, Mr. H. Allen discusses the theory of the outflow of air under falling rain. It has been assumed by some meteorologists that the rain, drops carry with them and compress the air, which, flowing out, produces at times a considerable wind velocity (*see article on*

"Lightning" in Johnson's Encyclopædia). Several hypothetical cases are considered, and the author concludes that, although his computations may need some modification after further study, we can safely say that no appreciable velocity of air is produced by compression from falling rain. The same journal contains a long paper on the theory of the wind-vane by Prof. G. E. Curtis, reprinted from the *American Journal of Science* for July last. He discusses the relative stability of a straight vane, and that with a double or spread tail. The first reference to the latter is apparently in *Voigt's Magazin*, 1797, and this form has been in common use in England since about 1840. The formulæ show that for a frictionless bearing (1) that the oscillations of both vanes are smaller as the vanes are longer and larger; (2) that the spread vane is always more stable than the straight vane; and (3) that this advantage in stability is greater for long vanes than for short vanes, and is independent of the wind velocity. The author finds that, with equal friction, a spread vane is the more sensitive, and that consequently for two vanes of equal sensitiveness the spread vane will have the greater friction and will come to rest more quickly.

THE *Jahresbericht* of the Central Physical Observatory of St. Petersburg for 1885 and 1886, and the *Annalen* for the year 1885, have recently been published. The Russian system is very important, not only as being the most extensive on the globe, but on account of the great climatic contrasts and the completeness of the observations. The present Director, Dr. H. Wild, of Berne, was appointed in 1867, and under his able superintendence the number of stations has greatly increased and the quality of the observations has much improved. The central Observatory is situated about a mile from the sea, on the island of Wassili-Ostrow; the principal observing department has been transferred since 1878 to Pawlowsk, about four miles distant, and is placed under the superintendence of Dr. E. Leyst. The observations for 1885 are contained in two quarto volumes of about 700 pages altogether. In addition to the first class observatories, the number of stations of the second order amounts to 255, and of these the monthly and yearly results of 208 are published on the international scheme; from 38 of the stations the observations are published *in extenso*. Many new stations have been added recently, especially in Siberia, and in newly-acquired territories, e.g. Merv, Batoum, &c. One of the Siberian stations, viz. Werchojansk (lat. $67^{\circ} 34'$, long. $133^{\circ} 51'$) is stated by Dr. Köppen to be the coldest known point of the earth. The mean temperature there for the year was $-2^{\circ} 9$ F. The mean for January and December was $-62^{\circ} 9$, and the minimum in January $-88^{\circ} 6$ (far beyond the range of the usual tables). The mean temperature of July rose to $60^{\circ} 6$, and the minimum for that month was $39^{\circ} 2$. The number of rainfall stations for which the observations are given is 650, against 252 in the previous year; the data published are the monthly values, the maximum fall in 24 hours, and the number of days of rain and snow. A complete catalogue of the meteorological observations in Russia and Finland, by Dr. E. Leyst, giving the life-history of each station, has been published in the *Repertorium für Meteorologie* this year. This work also contains many valuable discussions of the vast amount of materials available for the purpose. The index of the *Annalen*, being mostly in Russian, is difficult to refer to.

THE WORK OF THE INTERNATIONAL CONGRESS OF GEOLOGISTS.¹

I.

ELEVEN years ago the Association met at Buffalo. It was the year of the Centennial Exhibition, and we were honoured by the presence of a number of European geologists. This naturally opened the subject of the international relations of geology, and the proposition to institute a Congress of Geologists of the world took form in the appointment by the Association of an International Committee. The project thus initiated found favour elsewhere, and there resulted an international organization, which up to the present time has held three meetings. It was convened first at Paris in 1878, then at Bologna in 1881, and at Berlin in 1885. Its next meeting will be held

in London next year, and an endeavour will be made to secure for the United States the honour of the fifth meeting. The original Committee of the Association has been continued, with some change of membership, and has sent representatives to each session of the Congress.

The work of the Congress, as originally conceived and as subsequently undertaken, has for its scope geologic nomenclature and classification, and the conventions of geologic maps. The particular classifications attempted are the establishment of the major divisions used in historic and stratigraphic geology and the subdivision of volcanic rocks. In nomenclature three things are undertaken: (1) the determination of the names of historic and stratigraphic divisions, (2) the formulation of rules for nomenclature in palæontology and mineralogy, and (3) the establishment and definition of the taxonomic terms of chronology (period, epoch, &c.) and of stratigraphy (system, series, &c.). The map conventions most discussed are colours, but all signs for the graphic indication of geologic data are considered. The Congress has also undertaken the preparation of a large map of Europe, to be printed in forty-nine sheets.

The work was for the most part planned at the Paris meeting, and Committees were appointed to formulate subjects for action by the Congress at subsequent sessions. Briefly stated, the work accomplished to the present time is as follows. Agreement has been reached as to the rank and equivalence of the taxonomic terms employed in chronology and stratigraphy, a set of rules for palæontologic nomenclature has been adopted, and many sheets of the map of Europe have been prepared for the engraver. A partial classification of stratified rocks has been agreed to, and also a partial scheme of map colours, but the reports of proceedings indicate that action in these matters is tentative rather than final.

It is understood that both of these subjects will have prominent place in the proceedings at the London meeting, and the American Committee is endeavouring to prepare itself for representative action at that meeting by ascertaining the opinions of all American geologists on the various subjects. It has asked this Section to set apart a day for the discussion of some of the more important questions, and it can hardly be doubted that the Section will realize the mutual advantage of thus assigning the time requested. I am personally so impressed with the importance of the possible work of the Congress that I shall devote the present hour also to its consideration.

The first thing the Congress did was to select names for a set of categories to express the taxonomic rank of stratigraphic divisions on the one hand, and of chronologic divisions on the other. In the terminology of zoology and botany the words kingdom, class, order, family, genus, species, and so forth, however difficult of definition they may severally be, nevertheless are used always in the same order of inclusion. No systematist in those sciences would think of grouping orders together and calling them a family, or of styling a group of families a genus. But in geology there is no such uniformity of usage. With some writers a group is larger than a series, with others it is smaller. With some an age includes several periods, with others a period includes several ages. There are even writers who ignore the distinction between stratigraphy and chronology; and among the classifications submitted to the Congress is one in which an age is subdivided into systems. There is a manifest advantage in bringing order out of this chaos, and so great is the utility of uniformity and perspicuity that the decisions of the Congress in this regard will unquestionably be followed by future authors. The terms and the order adopted by the Congress are as follows. Of stratigraphic divisions, that with the highest rank is *group*, then *system*, *series*, and *stage*. The corresponding chronologic divisions are *era*, *period*, *epoch*, and *age*. This order of rank is strange to most English readers and writers, and so is one of the terms—*stage*; but the strangeness is only a temporary disadvantage, and will not seriously retard the adoption of the convention. The fact that we have previously used the words in a different sense, or that their etymology might warrant a different meaning, need not deter us, for we know from frequent experience that the connotations of a word transferred from one use to another quickly disappear from consciousness, leaving it purely denotative. The introduction of the word *stage*, which can hardly be said to have had an English status heretofore, or at least the introduction of some new word for that part of the column, was necessitated by the restriction of the word *formation* to a special meaning—the designation of mineral masses with reference to their origin.

¹ Vice-Presidential Address read to Section E of the American Association for the Advancement of Science, August 10, 1887, by Mr. G. K. Gilbert.